

REMARKS/ARGUMENTS

Claims 1-30 are pending in this application. Claims 1, 4, 6, 8, 10, 11, 14, 16, 18 and 20 are amended. Support for all amended claims can be found in the specification, and no new matter has been added by these amendments.

Claims 1-7, 10-17, 20-23, and 25-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application No. 2004/0233910 to Chen et. al (hereinafter "Chen") in view of U.S. Patent Application Publication No. 2003/0084241 to Lubbers et. al (hereinafter "Lubbers"). Claims 8, 9, 18, 19 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chen, in view of Lubbers, in further view of U.S. Patent No. 5,774,640 to Kurio (hereinafter "Kurio").

An interview was conducted with the examiner on December 13, 2006. Proposed claims were discussed. The undersigned would like to thank the examiner for his suggestions for further clarification in the claims. No agreement was reached, however.

The claims have been amended to more clearly distinguish over the cited art. Reconsideration of the claims in view of the amendments and the following remarks is respectfully requested.

Claims 1-7, 10-17, 20-23, and 25-30

Applicants have amended claims 1, 4, 6, 10, 11, 14, 16, and 20 to further clarify a limitation that was already present in the claims. Thus, the present set of amendments are not intended to surrender any claim scope.

Applicants submit that amended claims 1, 4, 6, 10, 11, 14, 16, and 20 are allowable over the combination of Chen and Lubbers. For example, claim 1 recites a storage device controlling apparatus including a plurality of first channel controllers:

wherein if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume and the plurality of first channel controllers shares the first logical volume, a data area of the file is locked with the use of the file lock table to prohibit an I/O process for the others of the plurality of requests to input/output from being performed while the first channel controller performs an I/O process for one of the plurality of requests to input/output; and

wherein if more than one of the plurality of first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume and the plurality of first channel controllers shares the first logical volume, the data area of the file is locked with the use of the logical volume lock table to prohibit an I/O process for the others of the plurality of requests to input/output from being performed while an I/O process is performed for one of the plurality of requests to input/output. (Applicant's claim 1, underlining added for emphasis).

In amended claim 1, the file lock table and the logical volume lock table are alternatively used for locking depending upon the number of first channel controllers that receive a plurality of requests to input/output data in a file in the first logical volume. If only one of the plurality of first channel controllers receives a plurality of I/O request, the file lock table is used for locking the file. However, if more than one of the plurality of first channel controllers receives a plurality of I/O requests, the logical volume lock table is used to prevent multiple first channel controllers from gaining access to shared logical volume in which the file data is located.

Chen discloses a system for storing and/or retrieving data which can be implemented on a storage area network. *Chen, Abstract*. Data storage may be accessed utilizing Device Level Access Protocol ("DLAP"), which transmits and retrieves data on a block level, and/or File Level Access Protocol ("FLAP"), which transmits and receives data on a file level. *Chen*, paragraph 0039.

Lubbers discloses systems, methods and software for implementing a virtualized storage system where physical storage is carved into units called physical segments ("PSEs") and logical storage is implemented in atomic logical storage units called "RStores." A user is presented with a logical disk comprising a pool of physical storage devices. The pool of physical storage devices is carved into redundant storage sets. Storage access requests are expressed in terms of logical disk addresses which are mapped to the PSEs containing data represented by the logical addresses. *Lubbers, Abstract*.

The Office Action relies upon Chen to disclose a file lock table and a logical volume lock table as recited in claim 1. The Office Action asserts that a logical lock volume table is inherent in the DLAP protocol described in Chen and that a file lock table is inherent in the FLAP protocol described in Chen. The Office Action relies upon Lubbers to teach a plurality

of first channel controllers sharing a first logical volume, and to teach (1) one of the first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume and (2) more than one of the first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume.

The Office Action asserts that a logical volume lock table is inherent in the DLAP protocol described in Chen and that a file lock table is inherent in the FLAP protocol described in Chen. Office Action, page 6, paragraph 1. Applicants submit that the use of a file lock table and a logical volume lock table as recited in claim 1 is not inherent in the use of the FLAP and DLAP protocols described in Chen. Chen is silent as to the implementation of the FLAP and DLAP protocols, and these protocols may be subject to different implementations using various means for controlling data access. Therefore, Chen fails to teach at least a logical volume lock table and a file lock table as recited in Applicants' claim 1.

Applicants further submit that, more significantly, Chen fails to disclose or even suggest at least alternatively using the file lock table and the volume lock tables to control access to a file on a first logical volume depending upon whether one channel controller or a plurality of different channel controllers receive input/output requests to output data to a storage device as recited in Applicants' claim 1. Applicants submit that Chen merely describes using FLAP for network-attached storage (NAS) clients and using DLAP for storage attached network (SAN) clients. Chen does not describe or suggest switching between the two protocols in order to perform locking at the file level or at the volume level depending on whether one or a more than one of the first channel controllers receives an I/O request. *See Chen, paragraph 0039.* Therefore, even if Chen's FLAP and DLAP protocols involve the use of tables as asserted in the Office action (which Applicant submits do not), Chen does not teach or suggest using a file lock table or a volume lock table depending on whether one or a more than one of the first channel controllers receives an I/O request.

Applicants further submit that Lubbers also fails to disclose or suggest at least these limitations of Applicant's claim 1. Applicants submit that Lubbers is silent as to alternatively using the file lock table and the volume lock tables to control access to a file on a first logical volume depending upon whether one channel controller or a plurality of different

channel controllers receive input/output requests to output data to a storage device. Therefore, Applicants submit that Chen and Lubbers, either alone or in combination, fail to disclose or suggest all of the features recited in independent claim 1. Accordingly, Applicants respectfully request that the rejection of claim 1 be withdrawn.

Independent claims 4, 6, 10, 11, 14, 16 and 20 have been amended to include limitations similar to claim 1, and should also be allowable for at least the reasons provided above with respect to claim 1. Furthermore, dependent claims 2, 3, 5, 7, 12, 13, 15, 17, 21-23 and 25-30 are also allowable at least due to their dependence from the independent claims 4, 6, 10, 11, 14, 16 and 20.

Claims 8, 9, 18, 19 and 24

Applicants have amended independent claims 8 and 18 to include limitations similar to the limitation amended into claim 1, and thus, the arguments presented above with respect to claim 1 similarly apply to independent claims 8 and 18.

The Office Action relies upon the combination of Chen, Lubbers and Kurio to disclose or suggest each of the limitations of claims 8, 9, 18, 19 and 24. However, as described above, the Chen and Lubbers, both independently and in combination, fail to disclose or suggest at least alternatively using the file lock table and the volume lock tables to control access to the volume depending upon whether one channel controller or a plurality of different channel controllers receive input/output requests to output data to a storage device. Kurio similarly fails to teach at least this limitation recited in independent claims 8 and 18.

Kurio discloses a fault tolerant network interface including primary and alternate network controllers, dual transceivers, dual cables and dual connectors. The fault tolerant interface of Kurio is driven by a logical device driver which controls the physical device drivers for the primary and alternate network controllers. If the primary network controller is found to be faulty, the secondary network controller will assume the physical address of the primary network controller and provides the services of the primary network controller while the primary network controller is effectively removed from the network. *Kurio, Abstract.*

Kurio is silent as to alternatively using the file lock table and the volume lock tables to control access to the volume depending upon whether one channel controller or a plurality of different channel controllers receive input/output requests to output data to a storage device as recite in independent claims 8 and 19.

Accordingly, Applicants submit that claims 8, 9, 18, 19 and 24 are in condition for allowance. Furthermore, dependent claims 9 and 24, which depend from claim 8, and dependent claim 19, which depend from claim 18, are also in condition for allowance at least due to their dependence from the independent claims.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



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Jeffrey S. King
Reg. No. 58791

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, Eighth Floor
San Francisco, California 94111-3834
Tel: 650-326-2400
Fax: 650-326-2422

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